

WHAT IS CLAIMED IS:

1. A process for the production of a polymer(s) having a Mooney viscosity of at least 25 Mooney-units and a gel content of less than 15 wt.% comprising
5 repeating units derived from at least one isoolefin monomer, more than 4.1 mol% of repeating units derived from at least one multiolefin monomer comprising mixing at least isoolefin monomers, at least one multiolefin monomer and optionally further copolymerizable monomers in the presence of AlCl_3 and at least one proton source and/or cationogen capable of
10 initiating the polymerization process and at least one multiolefin cross-linking agent,
wherein the process is conducted in the absence of transition metal compounds and organic nitro compounds,
wherein the process is continuous, and
15 wherein the conversion level of the polymer is between 50% and 95%.
2. A process according to Claim 1, wherein the polymer is produced at conversion levels ranging from 60 % to 95 and contains greater than 5 mol
20 % of repeat units derived from a multiolefin and a gel content of less than 10 wt. %.
3. A process according to Claim 1, wherein the polymer is produced at conversion levels ranging from 75 % to 95 and contains greater than 7 mol
25 % of repeat units derived from a multiolefin and a gel content of less than 5 wt. %.
4. A process according to Claim 1, wherein said isoolefin monomer is isobutene.

5. A process according to Claim 1, wherein the process is conducted in at least one continuous reactor having a volume between 0.1 m³ and 100 m³.
- 5 6. A process according to Claim 1, wherein the process is conducted in a continuous reactor having a volume between 1 m³ and 10 m³.
7. A process according to Claim 1, wherein the multiolefin is isoprene.
- 10 8. A process according to Claim 1, wherein said multiolefin crosslinking agent is divinylbenzene.
- 15 9. A polymer having a Mooney viscosity of at least 30 Mooney-units and a gel content of less than 15 wt.% comprising repeating units derived from at least one isoolefin monomer, more than 4.1 mol % of repeating units derived from at least one multiolefin monomer and optionally further copolymerizable monomers, wherein the polymer does not contain any transition metal catalyst residues or organic nitro compounds residues.
- 20 10. A polymer according to Claim 9 which has been either partially or completely chlorinated.
11. A polymer according to Claim 9 which has been either partially or completely brominated.
- 25 12. A polymer according to Claim 10 which has been maleated.
13. A polymer according to Claim 11, which has been maleated.

14. A polymer according to Claim 10 which has been functionalized with nucleophilic species selected from the group consisting of NR_3 , OR , SR , PR_3 , OPR_3 , OSiR_3 , -CR_3 , $\text{-O}_2\text{CR}$ where $\text{R} = \text{H, F, Cl, Br, I, C}_x\text{H}_2\text{CH}_3$ ($x = 0$ to 20), phenyl, any aromatic derivative, or cyclohexyl group.
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15. A polymer according to Claim 11 which has been functionalized with nucleophilic species selected from the group consisting of NR_3 , OR , SR , PR_3 , OPR_3 , OSiR_3 , -CR_3 , $\text{-O}_2\text{CR}$ where $\text{R} = \text{H, F, Cl, Br, I, C}_x\text{H}_2\text{CH}_3$ ($x = 0$ to 20), phenyl, any aromatic derivative, or cyclohexyl group.